HYBRID MULTI-TASKING

Multi-Laser Metal Deposition
Laser Metal Deposition
Wire Arc AM

AM SERIES

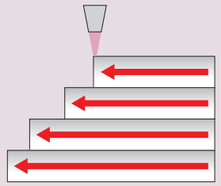
Additive Manufacturing

Mazak

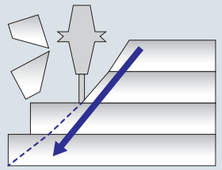
The integration of 3D additive manufacturing and multi-tasking machine

Hybrid multi-tasking machine - a fusion of the next-generation technologies and Mazak's extensive multi-tasking experience

3D additive manufacturing cladding

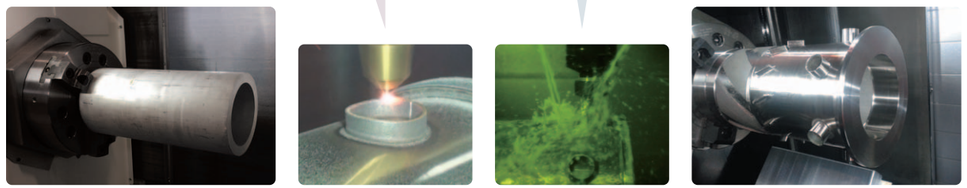


Finish with high-accuracy machining



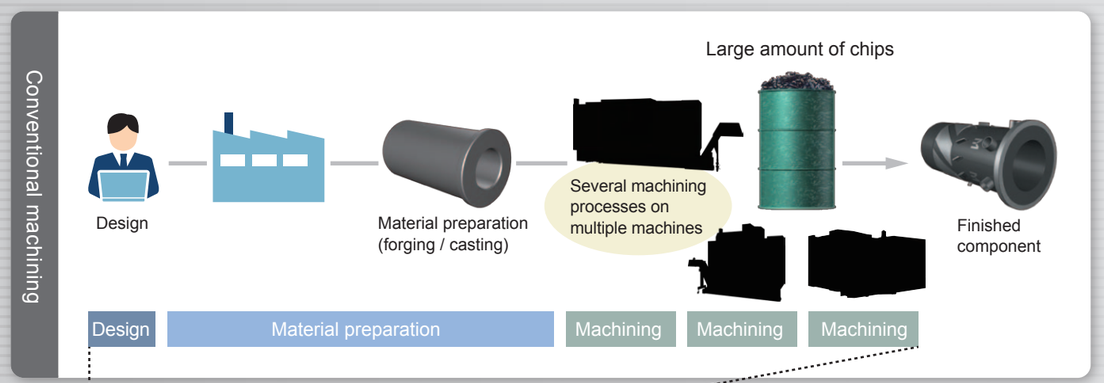
- High accuracy
- High repeatability accuracy
- Precision finished surfaces
- High productivity

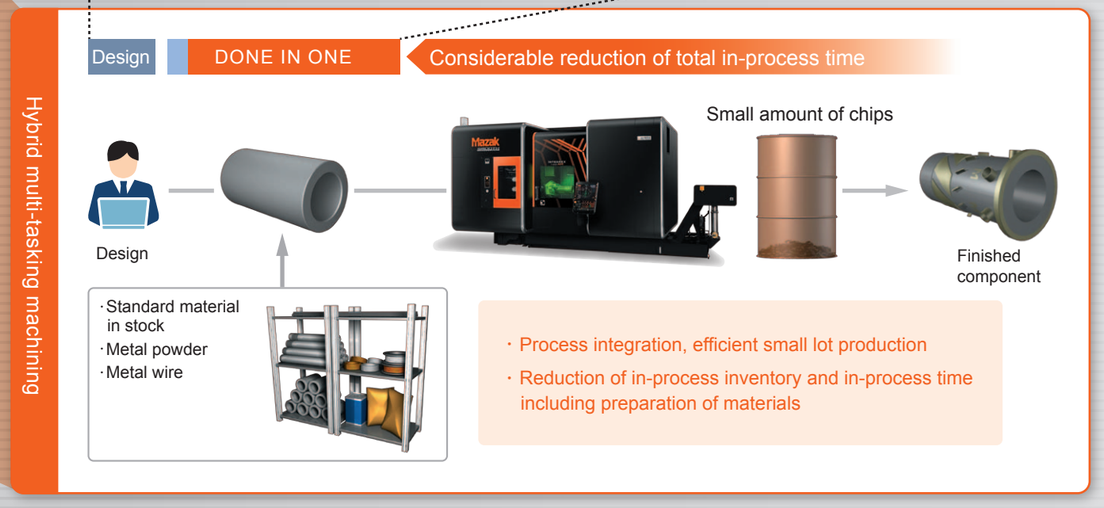
Machine :
INTEGREX series
VARIAXIS series
CNC turning centers
Vertical machining centers



Material → Finished component

Next generation manufacturing with hybrid multi-tasking machines

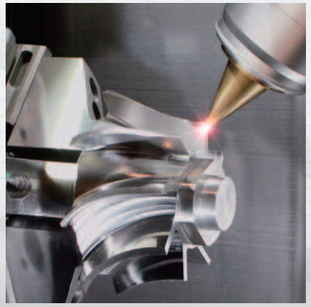


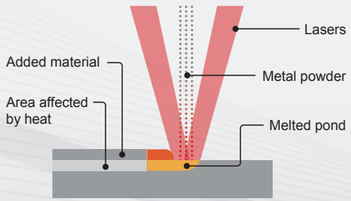


THREE AM TECHNOLOGIES

ADDITIVE MANUFACTURING

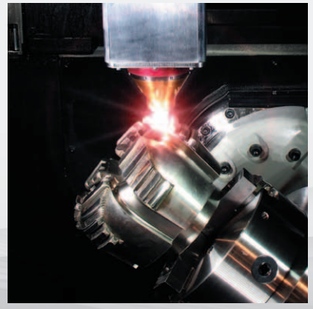
Multi-laser metal deposition

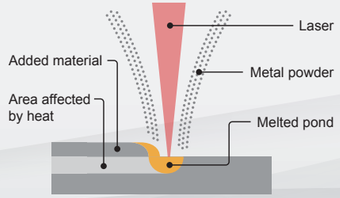




Multiple laser beams around the nozzle efficiently melts powdered material discharged from the nozzle center.

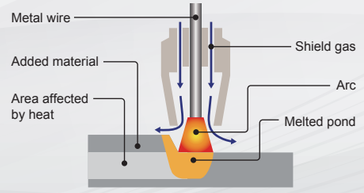
Laser metal deposition





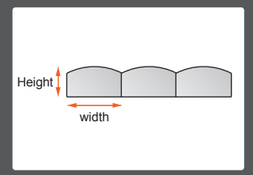
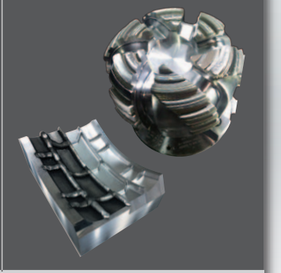
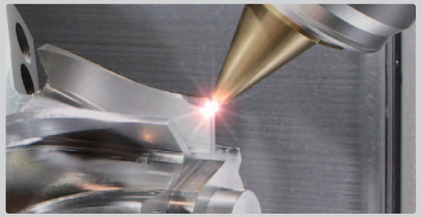
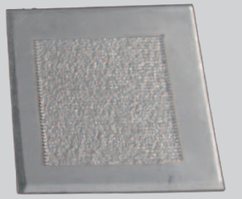
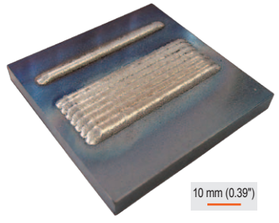
Laser from the nozzle center melts the base material and the metal powder discharged from around the nozzle.

Wire arc AM



Metal wire melted by an electrical arc is deposited on base material.

AM technologies to best meet your application requirements

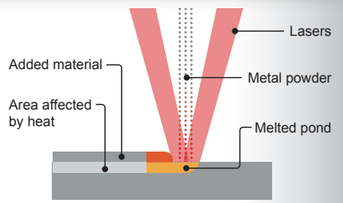
Types of additive manufacturing (Heat generation / Material)	Features	Size	Repair / modification	Micro manufacturing / cladding	Cladding (for sealing)	Near net shape
						
Multi-Laser Metal Deposition (Laser / Metal powder) 	■ Micro additive manufacturing ■ Coating on thin material that can be distorted by heat ■ Additive manufacturing with tilting head ■ Powerful joint with different types of metal	Applied material  Height : 0.2 mm (0.01") Width : 0.5 mm (0.02")	★★★	★★★	★★	★
Laser Metal Deposition (Laser / Metal powder) 	■ High speed additive manufacturing by high power laser ■ Powerful joint with different types of metal	Mid – rough surface  Height : 1.5 mm (0.06") Width : 3.0 mm (0.12")	★★	★★	★★	★★★
Wire Arc AM (Arc / Metal wire) 	■ Compatible with active metals such as aluminum and titanium ■ 10 times faster material deposition compared to laser deposition ■ High energy intensity ■ Rough accuracy	Rough surface  Height : 4.0 mm (0.16") Width : 7.0 mm (0.28")	★★ (Depends on application)	★	★★★	★★★ (Depends on application)

Multi-Laser Metal Deposition

- Stable supply of metal powder
- Efficiently welds metal powder reduces effect on base material
- Deviation of powder supply due to gravity is minimized even when AM head is tilted

Can be used for micro-additive manufacturing and cladding of thin base material that is affected by heat

Optimum construction for 5-axis additive manufacturing



Multiple laser beams around the nozzle efficiently melts powdered material discharged from the nozzle center

Sample workpiece　Integration of multi-laser metal deposition and machining

Micro additive manufacturing on roll die

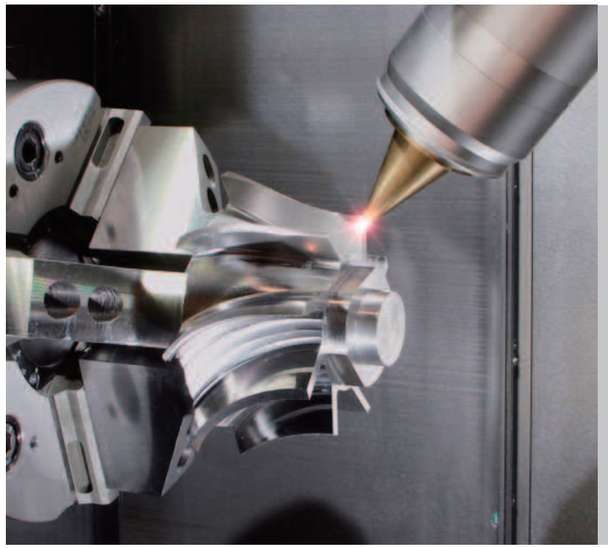
Base material : SUS316
Metal powder : SUS316L

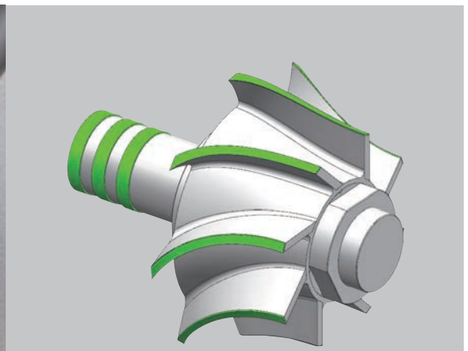
Cladding on impeller (For improved heat and wear resistance)

Base material : SUS304
Metal powder : Stellite No.6

INTEGREX i series / INTEGREX e-H series

Develop complex shapes and micro-manufacturing thanks to tilting AM head and prevention of powder supply deviation





- Improved strength and wear resistance on impeller fin and edge
- Improved shaft strength and wear resistance

  Alternative application for chromium plating on rotary joint seal surface

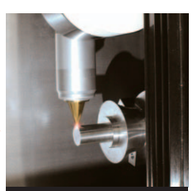
First process

Machining

Additive manufacturing (cladding)

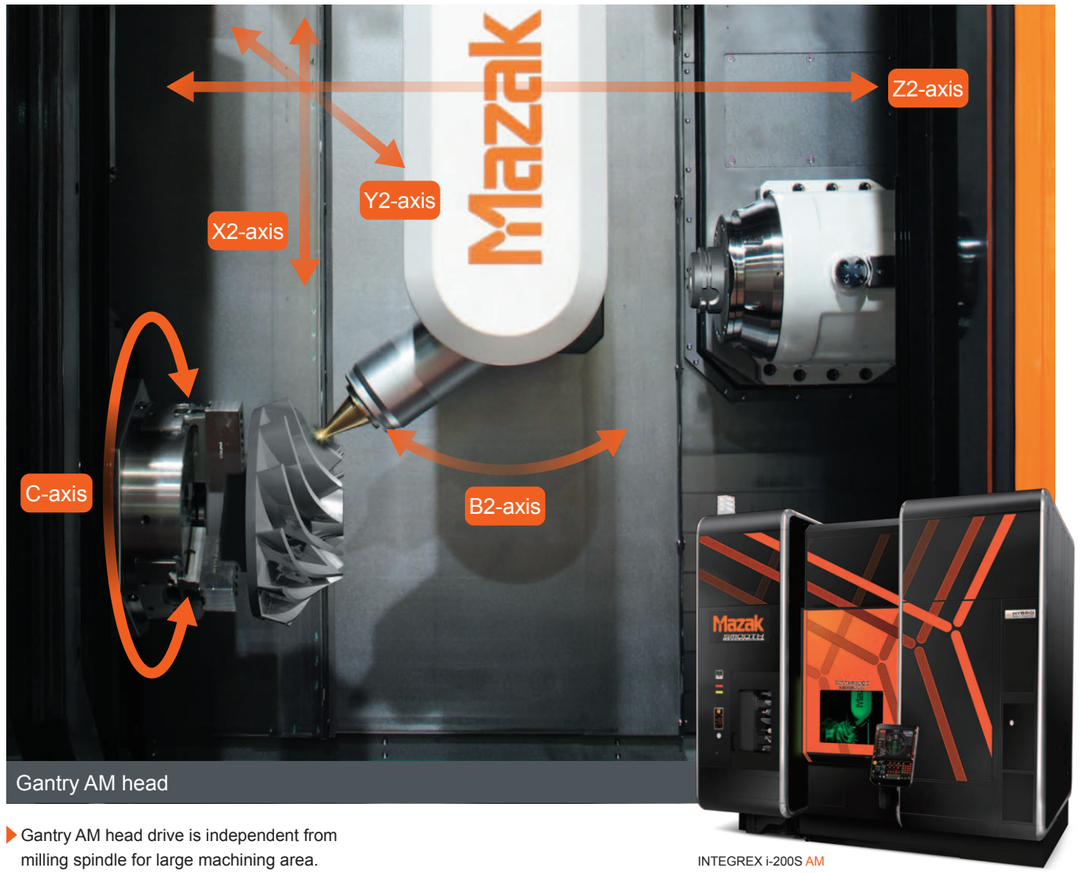
Grinding

Second process



Additive manufacturing (cladding)

Grinding



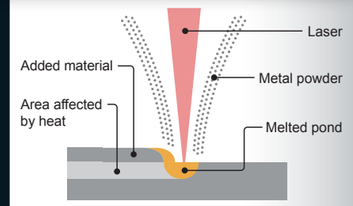
Gantry AM head

- Gantry AM head drive is independent from milling spindle for large machining area.

INTEGREX i-200S AM

Laser Metal Deposition

- High speed additive manufacturing by high power laser
- Powerful joint of different types of metal
- High strength (same level as solid material)



Laser from the nozzle center melts the base material and the metal powder discharged from around the nozzle

Sample workpiece　Integration of laser deposition and multi-tasking machining

Features deposited on base material

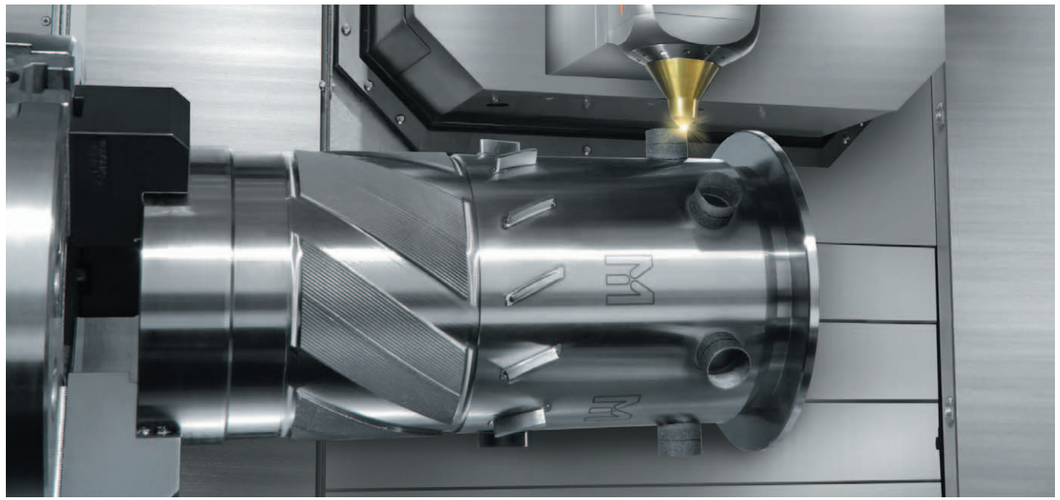
Base material : SUS316
Metal powder : Inconel 718

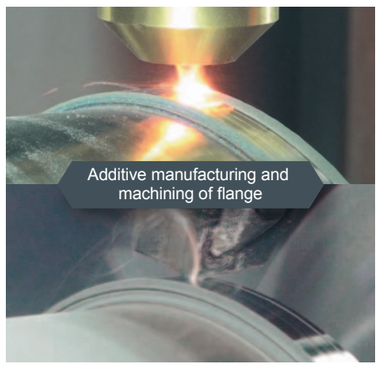
Near net shape of drill head

Base material : S45C
Metal powder : Inconel 718

INTEGREX i series / INTEGREX e-H series

- Laser AM head on multi-tasking machine
- Optimum AM head can be selected according to machining requirement and material

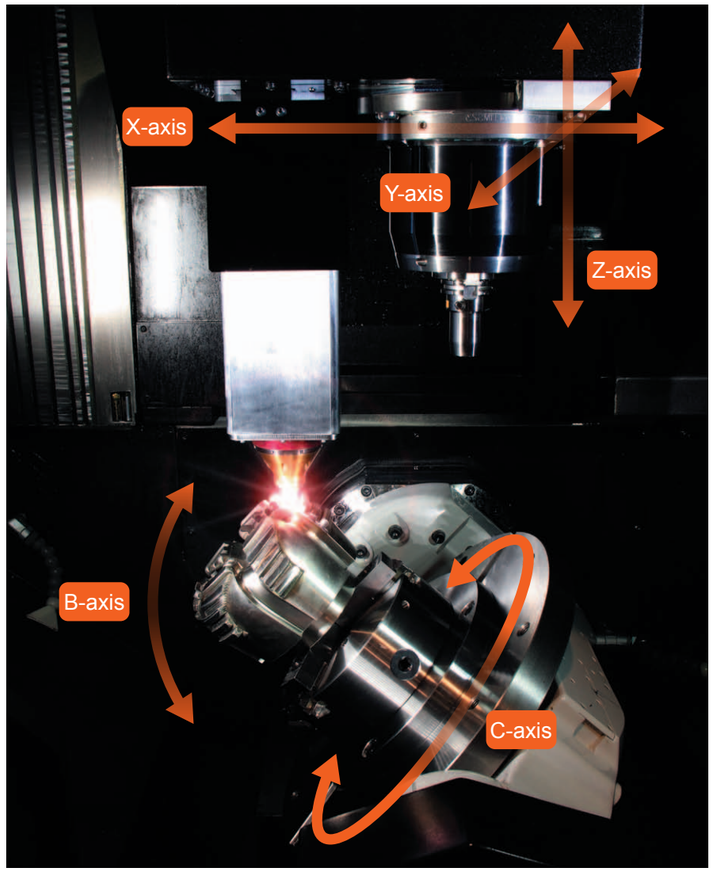




INTEGREX i-400 AM

VARIAXIS series

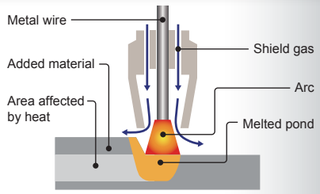
- Laser AM head on 5-axis vertical machining center
- Thanks to 5-axis control, additive manufacturing can be performed on any surface



VARIAXIS j-600 AM (shown with 30 tool magazine)

WIRE ARC AM

- Programmable welding automation
- Readily available material and easy handling (especially active metals)
- High speed additive manufacturing

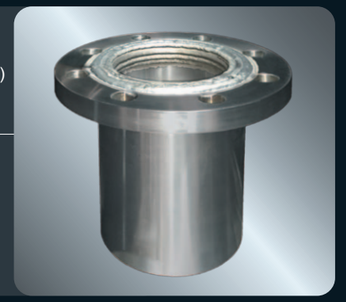


Metal wire melted by an electrical arc is deposited on base material

Sample workpiece　Integration of wire arc additive manufacturing and machining

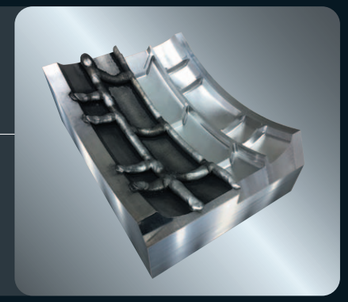
Coating on flange (for improved sealing)

Base material : SUS316
Metal wire : Inconel718



Near net shape tire mold

Base material : A5052
Metal wire : A5356

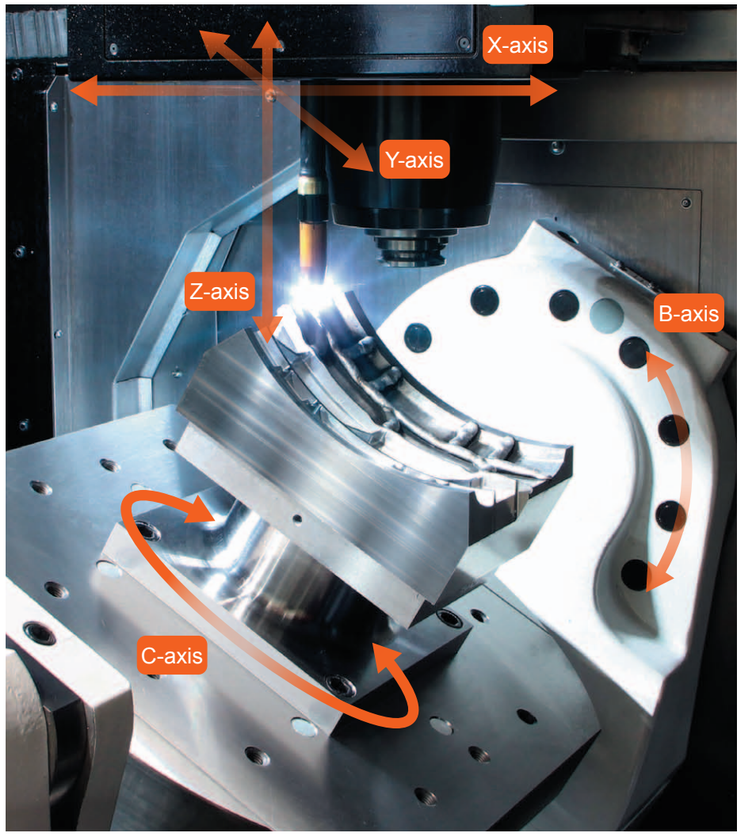


VARIAXIS series

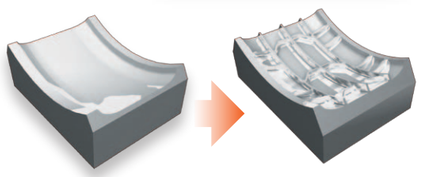
- Wire arc AM torch mounted on 5-axis machining center
- Off-the-shelf MIG welding system
- Thanks to 5-axis control, additive manufacturing can be performed on any surface

Additive manufacturing and finish machining are performed on inner diameter and flange for sealing in order to improve wear and corrosion resistance

VARIAXIS j-600 AM



Simultaneous 5-axis machining



- Additive manufacturing of convex area of tire mold and finish machining (can also be used for repair of molds)
- Thanks to compact AM torch, can approach workpiece interior

Hybrid Multi-Tasking machine tools
open new manufacturing possibilities
for every industry

AM SERIES

Mazak

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